

In re Application of: Ernest GRIMBERG
Serial No.: 10/567,438
Filed: February 7, 2006
Final Office Action Mailing Date: October 20, 2010

Examiner: Yara B. GREEN
Group Art Unit: 2884
Attorney Docket: **31322**
Confirmation No.: 5035

REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claims 62-64, 66-72, 74, 76-81 and 84 are in this Application. Claims 62-64, 66-72, 74, 76-81 and 84 have been rejected under 35 U.S.C. § 103. Claims 1-61, 65, 73, 75 and 82-83 have been canceled in a previous response. Claims 62, 74 and 79 have been amended herewith.

Amendments To The Claims

35 U.S.C. § 103 Rejections

For clarity, Applicants are describing the teachings of *Butler*, *Tsuchimoto*, *Everest* and *Frey* individually but are traversing the rejection with respect to the combination of these references, *infra*. That is, the Applicants are not attacking the references individually, rather addressing the combinations of references as set forth in the instant Office Action.

The Examiner rejected claims 62-64, 66-69, 71-72, 74, 76-80 and 84 as being unpatentable over US Pat. Appl. 2002/0074499 by Butler (hereinafter *Butler*) in view of US Pat. 5,944,701 by Tsuchimoto et al. (herein *Tsuchimoto*). It is submitted in response that independent claims 62, 74 and 79, and the claims dependent thereon, are patentable, in the light of arguments set forth below.

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The Examiner has agreed that *Butler* does not teach a separate function that corrects the object temperature by incorporating a sensor on the shutter, rather *Butler* uses the shutter information to correct non-uniformities amongst detector elements. The Examiner cites *Tsuchimoto* as including these features.

Applicant respectfully traverse for the reasons presented below.

Tsuchimoto presents an IR sensor device having a single IR sensor. *Tsuchimoto* measures the shutter temperature using a temperature sensor, and uses the temperature sensor reading to correct for errors introduced into the IR sensor output by the ambient temperature. Applicant acknowledges that *Tsuchimoto* performs a correction based on the temperature sensor reading. However Applicant respectfully asserts that *Tsuchimoto*'s correction differs in essence from that claimed herein.

The Examiner cites *Tsuchimoto* col. 8 lines 7-60 as disclosing deriving a reference temperature from a calibration temperature measurement obtained from a temperature sensor on the shutter. However *Tsuchimoto* does not derive a value reflecting a reference temperature from the temperature sensor output as claimed herein. Rather *Tsuchimoto* derives a value reflecting an energy level emitted from the shutter. *Tsuchimoto* col. 8 lines 39-49 explicitly teach:

The temperature of the shutter 3 which corresponds to the infrared beam component A', can be measured with the temperature sensor 5. This means that the infrared energy that is incident as the beam component A' on the infrared sensor 6, can be theoretically computed. The infrared energy emitted from the shutter 3 is theoretically computed for each wavelength using the Planck's equation of emission. The output of the infrared sensor 3 corresponding to the infrared energy incident thereon, can be computed through multiplication of the infrared energy for each wavelength by the spectral sensitivity of the infrared sensor 3.

Calculating an IR energy level, as performed by *Tsuchimoto*, does not provide a temperature value, as claimed herein.

Furthermore, the Examiner cites col. 9 lines 50-55 as disclosing the usage of the reference temperature as an offset. However since *Tsuchimoto* derives a value

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reflecting an energy level, corrections based upon *Tsuchimoto*'s value must be performed at the energy level not at the temperature level. It is seen that *Tsuchimoto* obtains the difference ($Q_W - Q_E$), where Q_E "represents the unnecessary infrared energy (b+c+d)" (see *Tsuchimoto* col. 9 lines 47-48). *Tsuchimoto* thus fails to teach a reference temperature which is an offset of a signal to temperature function.

The Examiner additionally cites *Tsuchimoto* col. 9 lines 20-30 as disclosing deriving a reference level comprising an average of the IR sensors at the time of the calibration temperature measurement. However *Tsuchimoto* does not utilize as sensor array; rather *Tsuchimoto* utilizes a single IR sensor. The concept of an average video output level is therefore academic. Even if one considers the average output of a single IR sensor to be equal to the sensor output, the difference between the IR sensor output and the reference level will yield zero in all instances. Since *Tsuchimoto* does not teach a sensor array having a plurality of sensors, nowhere can there be an indication that an average is taken over such an array. Therefore including *Tsuchimoto*'s IR sensor in *Butler*'s array will yield zero for each of the array sensors.

While disagreeing with the rejections, in order to expedite prosecution Applicant hereby amends independent claim 62 to state:

62. An infra-red imaging camera comprising:
 - an uncooled and unshielded detector comprising an array of infra-red (IR) sensors arranged to detect infra red radiated energy, said array comprising a plurality of IR sensors,
 - a non-uniformity corrector, associated with said detector, operable to perform non-uniformity correction on outputs of said array to provide uniform outputs having a uniform response to energy detected at said uncooled sensor, and
 - a calibrator to carry out periodic calibration operations by taking at least one calibration temperature measurement of a temperature of a shutter of said camera while said shutter is closed, using a first temperature sensor located on said shutter, and to derive a reference temperature from said at least one calibration temperature measurement, said reference temperature being a temperature indicative of radiated energy not from an external scene, and a reference level comprising an average video signal of said IR sensors at the time of said calibration temperature measurement, said average being taken

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over said plurality of IR sensors, and to calculate a temperature of objects in said camera's field of view for each of said plurality of IR sensors from a difference between a respective uniform output of said sensor and said reference level, said temperature being calculated using a same signal to temperature function for each of said sensors, wherein said reference temperature is an offset of said function.

Corresponding amendments have been made to independent claims 62, 74 and 79. Support is found *inter alia* on p. 8 lines 7-8 and p. 18 line 23 to p. 19 line 14 of the instant specification.

Independent claims 62, 74 and 79 now explicitly indicate that:

- i. The reference temperature comprises a temperature value, and
- ii. The average video signal is calculated over a plurality of IR sensors forming an array.

Thus neither *Butler* nor *Tsuchimoto*, alone or in combination, disclose all the limitations of claims 62, 74 and 79.

Applicant respectfully believes that the Examiner's objections are overcome by the present amendments.

It is believed that the dependent claims are allowable as being dependent on an allowable main claim. The specific objections against the dependent claims are therefore not responded to individually.

The Examiner rejected claim 70 as being unpatentable over *Butler* in view of *Tsuchimoto*, and further in view of US Pat. 4,907,895 by Everest (herein *Everest*). It is submitted in response that claim 70 is patentable in the light of arguments set forth below.

The Examiner states that *Everest* teaches coating at least part of the internal side of a shutter so that it is highly reflective to the infrared radiation generated by the shutter, and that it would be obvious to a person skilled in the art to apply this to *Butler* as modified by *Tsuchimoto*. Neither *Butler* nor *Tsuchimoto* nor *Everest*, alone

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or in combination, disclose "to derive a reference temperature from said at least one calibration temperature measurement, said reference temperature being a temperature indicative of radiated energy not from an external scene" nor "an average video signal of said IR sensors at the time of said calibration temperature measurement, said average being taken over said plurality of IR sensors". Thus neither *Butler* nor *Tsuchimoto* nor *Everest*, alone or in combination, disclose all the limitations of claim 70.

It is therefore submitted that claim 70 is both novel and inventive over the cited prior art.

The Examiner rejected claim 81 as being unpatentable over *Butler* in view of *Tsuchimoto*, and further in view of US Pat. 5,925,875 by Frey (herein *Frey*). It is submitted in response that claim 81 is patentable in the light of arguments set forth below.

The Examiner states that *Frey* teaches using a high pass filter in conjunction with a focal plan array in order to remove unwanted temporal noise and fixed pattern noise components of an image signal, and that it would be obvious to a person skilled in the art to apply this feature to the method of *Butler* as modified by *Tsuchimoto*. Neither *Butler* nor *Tsuchimoto* nor *Frey*, alone or in combination, disclose "to derive a reference temperature from said at least one calibration temperature measurement, said reference temperature being a temperature indicative of radiated energy not from an external scene" nor "an average video signal of said IR sensors at the time of said calibration temperature measurement, said average being taken over said plurality of IR sensors". Thus neither *Butler* nor *Tsuchimoto* nor *Frey*, alone or in combination, disclose all the limitations of claim 81.

It is therefore submitted that claim 81 is both novel and inventive over the cited prior art.

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Conclusion

In view of the above amendments and remarks it is respectfully submitted that claims 62-64, 66-72, 74, 76-81 and 84 are now in condition for allowance. A prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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Date: December 30, 2010

Enclosure:

- Request for Continued Examination (RCE)